

CLAIMS

1. Apparatus (1) for converting a flow of matter (4) containing hydrocarbons to a hydrogen-enriched fluid flow (10) with a heating apparatus (5) for production of a heating stream (6), whereby the flow of matter (4) is converted in a first converter (2) as well as in a second converter (3) arranged behind said first converter in a flow direction to a hydrogen-rich fluid flow (10) and a first heating element (8) that is flowed-through by a heating stream is provided for heating at least one of the first and second converters (2, 3), characterized in that at least in one operating phase, the heating stream (6) for the second converter (3) flows completely in a counterflow direction to the flow of educt matter (4).

2. Apparatus (1) according to claim 1, characterized in that at least in one operating phase, the heating stream (6) for the first and second converters (2, 3) flows completely in a counterflow direction to the flow of educt matter (4).

3. Apparatus (1) according to claim 1, characterized in that at least one second heating element (9) that is flowed-through by the heating stream (6) is provided for heating one of the first and second converters (2, 3) in a start phase.

4. Apparatus (1) according to claim 3, characterized in that the at least one second heating element (9) is disposed between the first and second converters (2, 3).

5. Apparatus (1) according to claim 3, characterized in that an inlet opening (12) and/or an outlet opening (11) of the first and/or second heating element (6, 8) has at least one apportioning element for apportioning the heating stream (6).

6. Apparatus (1) according to claim 5, characterized in that at least one control unit is provided for controlling the apportioning element.

7. Apparatus (1) according to claim 3, characterized in that the first and second converters (2, 3) and/or the first and second heating elements (8, 9) are arranged approximately coaxially to one another.

8. Apparatus (1) according to claim 3, characterized in that the heating apparatus (5) is arranged approximately coaxially to the converters (2, 3) and/or the heating elements (8, 9).

9. Apparatus (1) according to claim 3, characterized in that the heating apparatus (5) is arranged approximately centrally to the converters (2, 3) and/or the heating elements (8, 9).

10. Fuel cell assembly with a fuel cell unit and an apparatus (1) for converting a hydrocarbon-containing flow of matter (4) to a hydrogen-enriched fluid flow (10), whereby the flow of matter (4) is converted in a first converter (2), as well as in a second converter (3) arranged behind the first converter (2) in a flow direction, to a hydrogen-enriched fluid flow (10), and a heating apparatus (5) is provided for production of a heating stream (6) as well as a first, heating element (8) that is flowed-through by the heating stream (6) for heating at least one of the first and second converters (2, 3), characterized in that the apparatus (1) is formed according to claim 1.

11. Motor vehicle with a fuel cell assembly, characterized in that the fuel cell assembly is formed according to claim 10.